REMARKS

Re-examination and reconsideration of the rejections are hereby requested.

The present invention is directed to a receiver for and method of receiving signals that comprise a linear combination of a plurality of signature signals having undergone some distortion. For example, each user in a system is associated with one of a set of signature signals s_k that distinguishes the particular user's signal from all other signals propagating within the system. That is, the receiver must process the received signal and distinguish an individual signature signal from among the linear combination of distorted signature signals it received.

The received signal that is a linear combination of the individual signature signals is first processed by a bank of correlators which may be, for example, a matched filter or a decorrelator receiver. The received signal is processed by a bank of correlators to generate a vector output and the vector output is then shaped by a correlation shaper. The receiver of the invention thus distinguishes an individual signature signal from among the linear combination of the distorted signature signals it receives. In one embodiment, the correlation shaper is a whitening transformation. Such whitening transformation may be determined by minimizing the mean squared error between the vector output from the bank of correlators and the output vector from the correlation shaper. In one embodiment, the correlation shaper is chosen so that a covariance matrix of an output vector of the correlation shaper has the property that the second and subsequent rows are permutations of the first row.

Claims 1, 2, 14-27 and 37-48 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Bottomley, *et al.*, U.S. Patent No. 6,801,565. This patent relates to a spread spectrum communications method and apparatus in which information encoded in a spread spectrum signal transmitted in a communications medium is recovered. Bottomley contemplates the reception of a "composite signal" but does not disclose that such signal is a linear combination of signals set forth in the independent claims. The Examiner appears to have ignored this limitation in the claims. Nowhere does Bottomley suggest that the received signal is a linear combination of signature signals. It is telling that the Examiner does not so characterize Bottomley's teaching. The Examiner states merely that Bottomley's "receiver receives a composite signal r(t) from the communication medium." The undersigned has reviewed the Bottomley reference

carefully and can find no teaching that the received signal is a linear combination of signature signals. The Examiner is asked to point out where the linear combination limitation is met by Bottomley.

Next, the Examiner asserts that the elements 420a, 420b and 450 are correlation shapers. In fact, the elements 420a, 420b and 450 merely combine the correlations that come from the correlators 412. Bottomley defines the channel compensating combining at column 6, line 46 to be "combining operations that include the use of channel coefficients, including, but not limited to, operations that match a channel response." That is not correlation shaping as disclosed in the present application for example at column 9 in the equations at lines 12 and 13.

Since at least two limitations of the independent claims are missing from Bottomley, it is submitted that the 35 U.S.C. § 102(e) rejection is inappropriate and it is asked that this rejection be reconsidered and removed.

With respect to claim 14, the Examiner states that Bottomley discloses using orthogonal spreading codes to spread the transmitted signals citing Bottomley at column 9, lines 56-58. At this location, Bottomley is discussing calculation of the components of an impairment correlation matrix R and states that if orthogonal spreading is used, a certain parameter $\alpha = 1$. It is noted that pending claim 14 depends from claim 1 and recites that the bank of correlators cross-correlates the received signal with a set of orthogonal signals. That is not what is disclosed at column 9, lines 56-58 in Bottomley. Pending claim 17 recites that the bank of correlators cross-correlates the received signal with a set of geometrically uniform signals. This limitation is entirely missing in Bottomley. Claim 19 states how the geometrically uniform signal is determined and claim 20 recites that the bank of correlators cross-correlates the received signal with a set of projected orthogonal signals. Claim 21 recites that the set of projected orthogonal signals is determined by minimizing the least squares error between the set of projected orthogonal signals and the set of signature signals. All of these limitations are missing in Bottomley. Reconsideration is requested.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bottomley in view of disclosed prior art. Claim 3 depends from claim 1 and recites that the bank of correlators is a matched filter receiver. While matched filter receivers are certainly known in the prior art, their

combination with the other limitations of claim 1 are not known and it is submitted that claim 3 is allowable.

Claims 4-6, 9-11, 27-30, 33 and 34 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Bottomley in view of Huang et al., U.S. patent 6,067,292. Claim 4 recites that the receiver includes a correlation shaper that performs a whitening transformation. The Examiner is asked to explain how the combination of Bottomley and Huang renders obvious a whitening transformation limitation since neither reference mentions whitening. As to claims 5 and 6 there is recited minimizing mean square error between the vector output from the bank of correlators and an output vector from the correlation shaper. In contrast, the portions of Huang recited by the Examiner concern pilot cancellation signals that are selected to minimize the mean square error of the demodulated CDMA signal. That disclosure does not meet the limitations of claims 5 and 6. Claim 9 recites that the correlation shaper is a subspace whitening transformation and claim 10 recites how the subspace whitening transformation is determined. These limitations are met neither by Bottomley nor Huang. Claim 11 depends from claim 6 and recites that the transformation is performed on a subspace. This limitation also is absent in Bottomley and Huang. Reconsideration of these rejections is requested.

Claims 7, 8, 12, 13, 31, 32, 35 and 36 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Bottomley in view of Heikkila, U.S. patent publication 2002/0122470. Claims 7, 8, 12, 13, 31, 32, 36 all include the limitation that the correlation shaper is chosen so that a covariant matrix of an output vector or a representation of an output vector of the correlation shaper has the property that the second and subsequent rows are permutations of the first row. The Examiner has ignored this limitation in his discussion of the teaching of the Heikkila reference. The Examiner states that Heikkila "utilizes the rows of a covariance matrix as stated in the abstract." The abstract teaches that directly computed or estimated filter elements of a row or a column of the inverse covariance matrix are used as linear filter coefficients. There is absolutely no teaching or suggestion in Heikkila that a correlation shaper is chosen so that a covariance matrix of an output vector has the property that the second and subsequent rows are permutations of the first row. The Examiner is asked to point to the locations in Bottomley or Heikkila that disclose that the correlation shaper is chosen so that the covariance matrix of an output vector from the correlation shaper has the property that the second and subsequent rows

are permutations of the first row. It is submitted that this limitation is not to be found in the cited references.

For the foregoing reasons, it is submitted that the pending claims are in condition for allowance and early favorable action is requested.

Respectfully submitted,
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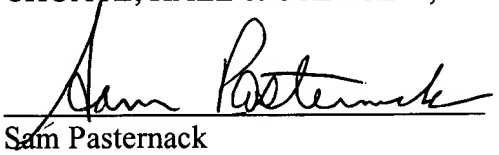

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